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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/679,168	10/06/2003	Richard Scott Bourgeois	130026	3956

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GENERAL ELECTRIC COMPANY  
GLOBAL RESEARCH  
PATENT DOCKET RM. BLDG. K1-4A59  
NISKAYUNA, NY 12309

EXAMINER
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ECHELMEYER, ALIX ELIZABETH

ART UNIT	PAPER NUMBER
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1745

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	02/26/2007	PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

## Office Action Summary

**Application No.**

10/679,168

**Applicant(s)**

BOURGEOIS ET AL.

**Examiner**

Alix Elizabeth Echelmeyer

**Art Unit**

1745

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 22 November 2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-21 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-21 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)   | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                       | 5) <input type="checkbox"/> Notice of Informal Patent Application                       |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

**DETAILED ACTION**

***Response to Amendment***

1. This Office Action is in response to Applicants' amendments filed November 22, 2006. Claims 14 and 16 have been amended. Claims 1-21 are pending and are rejected for the reasons given below.

***Claim Objections***

2. The objection to claim 16 is withdrawn in light of the amendment.

***Claim Rejections - 35 USC § 112***

3. The rejection of claim 14 is withdrawn in light of the amendment.
4. The rejection of claim 16 is withdrawn in light of Applicants' argument.

***Claim Rejections - 35 USC § 102***

5. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

6. Claims 1-4, 6, 8-11, 14-16 and 17-21 are rejected under 35 U.S.C. 102(b) as being anticipated by Hsu (US Patent Number 4,721,556).

Hsu teaches an electrochemical converter using thin plates of solid oxide electrolyte and interconnectors. The assembly of the stack is designed to ensure that

the brittle electrolyte layers remain in compression during operation of the cell (abstract).

The prestressed electrolyte plates are formed by heating the system, including the metal interconnect plates, to a temperature above the anticipated operating temperature of the system. The heating causes the plates to fuse together and the metal interconnect plates to expand, putting them in tension. When the assembly cools, the electrolyte plates experience in-plane compression due to the lower coefficient of thermal expansion (CTE) than the adjacent metal interconnects (column 3 lines 7-27; column 8 lines 14-33; Figure 7).

Regarding claims 1 and 21, Hsu teaches that compression is the favorable stress state for the ceramic electrolyte layers (column 3 lines 25-27). The metal interconnect plates induce stress on the ceramic layers.

As for claims 2 and 3, the electrolyte of Hsu experiences stress "in-plane" (column 3 lines 7-27). This is interpreted by the examiner to suggest that the stress is multi-axial, including a uniaxial as well as biaxial stress.

Regarding claims 4 and 6, the metal interconnect or stress inducer of Hsu is prestressed by heating during assembly of the stack. Since the metal interconnect is among several layers, it is attached to a layer other than the brittle layer on the other side of the plate than the interconnect layer.

Regarding claims 8-9 and 16, Hsu teaches that the CTE of both the electrolyte layer and the metal interconnect are known, and the CTE of the electrolyte layer is lower than that of the metal interconnect (Table I). With further regard to claim 16, the

electrolyte layer and metal interconnect may be formed at 800°C, which is below the operating temperature of the fuel cell (column 3 line 18, column 6 lines 64-65).

As for claims 10 and 15, Hsu teaches that the cell is formed at a temperature higher than the operating temperature of the system, and that there is a mismatch of thermal expansion coefficients between the brittle layer and the metal layer, anticipating that the CTE of the electrolyte layer may be higher than the CTE of the metal layer (column 3 lines 7-27). As for claim 11, the first coating of the brittle layer can be applied to the metal interconnect prior to heating to a temperature that would cause significant expansion (Figure 5).

Claim 14 is drawn to the ratio between the thickness and width of the brittle layer. Although the width of the layer is not clearly defined by Hsu, the specification gives ranges for the thickness in Figure 6. As seen in Figure 1, the ratio of thickness to width of the brittle layer is far lower than 1.

Claims 17-20 are drawn to a method for fabricating the brittle layer of the fuel cell. Hsu teaches also the methods for making the cell described above (column 1 lines 11-14; column 3 lines 7-27; column 8 lines 17-33).

### ***Claim Rejections - 35 USC § 103***

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

8. Claims 5, 7, 12 and 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hsu in view of Bothwell (US Patent 4,276,331).

The teachings of Hsu as discussed above are incorporated herein.

Hsu teaches the prestressed reinforcement structure and brittle layer but fails to teach a wire-structure, fiber structure, wire-mesh structure, or perforated sheet structure embedded in the brittle layer.

Bothwell teaches a metal grid coated with a ceramic slurry. The plate is then heated, putting the metal in tension. When the assembly cools, the tension on the metal is relieved and the ceramic is under compressive stress (column 2 lines 21-50).

Bothwell further teaches that the present invention fulfills the need for low cost thermal insulating materials with good structural mechanical strength, resistance to severe cracking due to thermal cycling and ample physical strength to withstand deterioration or attrition from exposure to hot gases.

It would have been advantageous to use the ceramic structure as taught by Bothwell in the cell taught by Hsu because the ceramic structure of Bothwell offers many advantages such as resistance to deterioration caused by exposure to hot gases as would occur in the operation of the cell of Hsu.

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to use the ceramic structure of Bothwell in the cell of Hsu in order to increase the durability of the system.

### ***Response to Arguments***

9. Applicant's arguments filed November 22, 2006 have been fully considered but they are not persuasive. Applicants argue that Hsu does not teach all limitations of claims 1, 15, 16, 17 and 21 of the instant invention. Specifically, Applicants argue that Hsu does not teach the stress inducer described in the specification.

The examiner disagrees. The metal interconnect of Hsu reads on the stress inducer as claimed in the instant invention. The metal interconnect of Hsu induces a planar compressive stress to the brittle electrolyte layer.

Claim 1 of the instant invention is drawn to "a stress inducer for inducing a planar compressive stress to at least one of said brittle layers."

### ***Conclusion***


Any inquiry concerning this communication or earlier communications from the examiner should be directed to Alix Elizabeth Echelmeyer whose telephone number is 571-272-1101. The examiner can normally be reached on Mon-Fri 7-4:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's trainer, Susy N. Tsang-Foster can be reached on 571-272-1293. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Alix Elizabeth Echelmeyer  
Examiner  
Art Unit 1745

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SUSYTSANG-FOSTER  
PRIMARY EXAMINER